

## THE WORLD OF COPPER: PROPERTIES, USES, PRODUCTION AND TRADE

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**Introduction:** This is a synopsis of a 5-frame Thematic Class exhibit at Liberec 2022. I exhibited it in 3 frames at the Armistice (National) Stamp Show, Dunedin, New Zealand (Nov. 2018) – Vermeil; and London Stampex (Oct. 2021) – Large Gold. Key changes after Dunedin were the addition of: (i) a chapter on the origins and geology of copper (*which provides context*); (ii) material on copper salts (*a response to judges' feedback*); and, (iii) material on copper mining, metallurgy and trade to emphasize copper's economic importance through history (*after discussion with a renowned European exhibitor*). There is great variety of philatelic material (*noted by Stampex judges*). It also includes material from my 1-frame *Falu Gruva: Viking Mine to World Heritage Site* SAVPEX 2020 (87 points).

I organize the material using a timeline encompassing copper's 10 millennia-long history (the longest of any metal) to show how important discoveries, uses, production methods and trade have evolved.

The exhibit's **aim, purpose and scope** are to illustrate how and when the properties of copper and its main alloys were discovered and first used since 8000 BCE<sup>1</sup>; how they are associated with advances in technology; how they have influenced culture and society; and, how that has stimulated trade and led to advances in mining and metallurgy. The take home message is that *copper is an extremely important metal globally with a very long and influential social and economic history*.

**Background and Context:** Copper was discovered during the Neolithic in modern-day eastern Turkey. The first properties exploited were malleability and ductility. Archaeologists call it '*the first metal*'. It was very important in the Ancient, Greek and Roman Worlds. The Copper and Bronze Ages are named after it. Alloying to make bronzes and brasses were early discoveries, as was its use as a

pigment, and in jewelry and bell making. Later it was used to make coins and cannons, and in building and printing. During the Scientific and Industrial Revolutions (c.1550-1850) the discovery of its biocidal properties led to its use in shipping and crop protection. Electrical conductivity, its most important property, was exploited at the start of the 19<sup>th</sup> Century; though unknowingly this was the basis of lightning conductors from the 1750s onwards. Its ability to conduct heat was also exploited at the start of the 19<sup>th</sup> Century. Copper use and production has increased exponentially from the Industrial Revolution. It's role in maintaining animal and plant health was discovered in the 20<sup>th</sup> Century, as was its vital role in human health.

It was first commercially traded in the Arabian Peninsula. From the late Bronze Age to Roman times a copper trade connected the Mediterranean to the British Isles, and to China and India. During the Medieval Era mines in Bohemia, Saxony and Hungary were the major producers until overtaken by the Swedish Falun mine. European colonial expansion introduced copper mining to new worlds. The Spanish opened mines in the Americas from the 16<sup>th</sup> Century, though these often failed. Then, between c.1830-1870, mines in British colonies and the Americas started to ship ore to South Wales for smelting – an early example of globalization. The main focus of mining and smelting moved to the western USA in the late 1800s. A major shift in mining techniques led to the development of large open pit mines around the Pacific Rim, from Chile to Papua New Guinea, from start of the 20<sup>th</sup> Century. Indigenous copper mining in the Americas before 1492 is not considered in this exhibit.

**Structure and Plan:** Chapters 2-4 are organised around a time line of when copper's properties were discovered and first used. Chapter 2 covers the Ancient and Medieval worlds (8000 BCE to c.1550 CE); Chapter 3 covers the Scientific and Industrial Revolutions; and Chapter 4, the decades since the Industrial Revolution. Chapter lengths reflect the extent of discoveries in each time period. Chapter 1 considers the origins and geology of

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<sup>1</sup> Date notation: BCE (before Common Era) and CE (Common Era), e.g., the French Revolution began in 1789 CE.

copper, while the final chapter takes a glimpse at copper's future.

The exhibit is more a comprehensive and innovative treatment of a mineral than is often seen, e.g., two exhibits on gold I saw at the NYC 2016 Stamp Show. It is innovative because it focuses on properties, uses and trade, and then links these to the evolution of mining and smelting; rather than starting with a long section on geology and all aspects of mining and smelting before selectively considering some uses of metals. This point was also noted in judge's 'at the frames' feedback at Stampex 2021. There are few areas where discoveries could be expanded (e.g., unusual chemical uses), but lack of material has been an obstacle so far.

**Significance to a wider audience:** I believe the exhibit is significant for audiences globally given copper's geographical and historical importance.

#### **Highlights:**

1 Jordan 1974, Austrian State Printers proof book page, with 60 fils copper Dead Sea Scroll stamp. Signed off by the Jordan Ministry of Posts & Telecommunication. *Probably unique.*

2 DDR 1970, Progressive and phase proofs, bronze bowl. *Up to 10 proof sets exist per issue from the German State Security Printers.*

3 Nigeria 1965, Original artwork, Tada Bronze. *Probably unique.*

4 Great Britain 1857, Cover from London to US Niagara Sent during the 2 months the ship docked at Plymouth, Devon during laying of first Transatlantic Cable.

5 North Korea 1959, Adopted artwork, electric railway showing catenary system. *Probably unique.*

5 Central African Republic 1959, Sepia printer's proof, Green Turaco. *2-4 sepia printer's proofs exist per stamp issued.*

6 Cuba 1835, Swansea Ship Letter cancellation on entire sent from Royal Santiago Mines, Cobre, Cuba to Cornwall, England.

7 South Australia 1851, Entire from Kooringa to Adelaide. *Only known use of Crown Paid canceller without date.*

8 South Australia 1863. Entire to Nuccalena routed through Blinman. *Nuccalena was a copper mine and settlement from 1861-1866. This is one of first items of mail sent through Blinman PO (another copper*

*mining town) established in 1863 and bears manuscript markings.*

9 Cape Colony 1855, Grahamstown to Capetown entire, forwarded to Springbok. *Probably first item handled by Springbok post office, established around a newly opened copper mine.*

10 Niuafo'ou 1998, Cromalin proof, sheep grazing. *5 exist.*

#### **Bibliography**

**Evans, C. & Saunders, O. (2015)** A world of copper: globalizing the Industrial Revolution, 1830-70.

*Journal of Global History* 10(1), 3-26.

<http://researchonline.ljmu.ac.uk/id/eprint/9526/1/World%20of%20Copper%20REVISION%202.pdf>

Last accessed 9 Mar 2021

**Millington, A.C. (2020)** Falun Mine: Viking Mine to World Heritage Site in 1500 Years, or thereabouts. *Thamescene*, 37(1) Whole No. 139, 4-9. A pdf of this article can be supplied by the exhibitor on request [acmillington@gmail.com](mailto:acmillington@gmail.com)

**Smith, B.W. (n.d.)** *60 Centuries of Copper*. Copper Development Association. McLean VA.

<https://www.copper.org/education/history/60centuries/> Last accessed 9 Mar 2021.

You can zoom in on the infographic on the next page which provides a timeline and key facts about copper. It's source is:

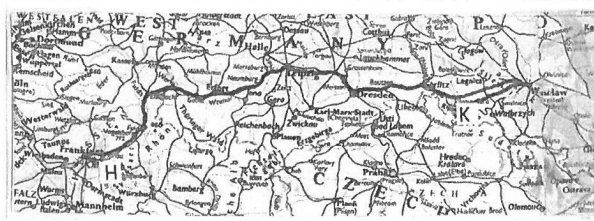
[https://www.visualcapitalist.com/copper-the-essential\\_metal/](https://www.visualcapitalist.com/copper-the-essential_metal/)



# THE WORLD OF COPPER: Properties, Uses, Production and Trade (Draft)

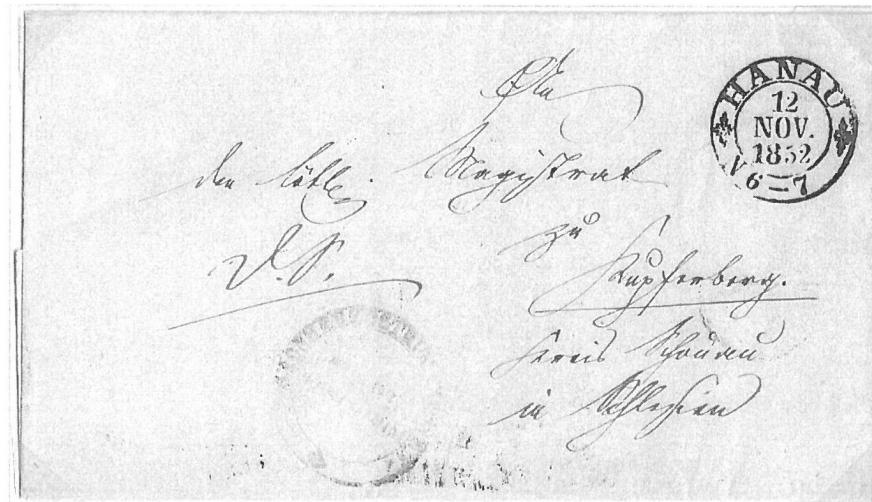
This thematic exhibit shows how properties of copper and its alloys have been exploited and used over ten millennia; and how trade in copper evolved and, in turn, influenced mining and smelting. Initially, copper's origins are considered, and the exhibit concludes by asking 'Will we run out of copper?'

The exhibit includes a wide variety of material from over 100 postal administrations and is organised around a time line which introduces properties in the order they were discovered from the first – malleability and ductility - to the last – its role in our health. The chronology used in the timeline is from western Asia and southern Europe.



Postal route taken, based on Jügel's 1843 map of German postal routes. H – Hanau, K – Kupferberg

Thurn and Taxis wrapper sent from Hanau (Hesse) 12 Nov 1852 to Kupferberg (Prussia). Hanau became an important jewellery and metalworking centre after a 16<sup>th</sup> Century migration of Walloon metalsmiths. Copper mining at Kupferberg began in the same century. The item illustrates trade between centres of copper supply and demand, and that trade routes were important in the development of postal services. The cover travelled through Frankfurt, Eisenach, Erfurt, Leipzig and Breslag (Wrocław), arriving at Kupferberg four days later.



Wrapper, reverse. Reduced 50%.

Copper discovered in Asia Minor.  
malleability and ductility exploited

Earliest recorded copper  
trade, Arabian Peninsula

True bronze making  
starts in Near East

Brass making  
starts in India

Copper exploited  
as a pigment

Copper's roles as a fertiliser and  
in human health discovered

Corrosion resistance  
exploited in roofing

Electrical and thermal  
conductivity discovered

Biocidal properties discovered

NEOLITHIC ERA

CHAPTER 1

Plan

COPPER AGE

BRONZE AGE

GREEK & ROMAN EMPIRES

MEDIEVAL ERA

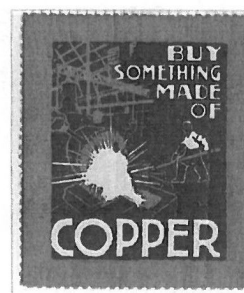
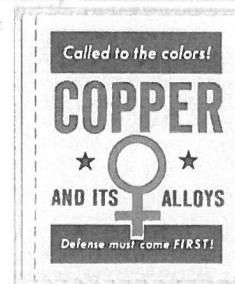
8000 BCE

4000 BCE

CHAPTER 2

0 CE

| CHAPTER  | Plan  | PAGES     |
|----------|---|-----------|
|          | <b>TITLE, INTRODUCTION AND PLAN</b>   | <b>2</b>  |
| <b>1</b> | <b>FROM THE BIG BANG TO THE STONE AGE</b>   | <b>6</b>  |
| 1.1      | Cosmogogenesis and the geology of copper  | 4         |
| 1.2      | Copper is discovered and mined, accidental alloying follows                                     | 2         |
| <b>2</b> | <b>DISCOVERIES, USES, PRODUCTION AND TRADE IN THE ANCIENT AND MEDIEVAL WORLDS</b>               | <b>28</b> |
| 2.1      | Copper and its alloys in everyday life, strife and devotion                                     | 8         |
| 2.2      | Bringing bronze to Babylon – the earliest trade in copper?                                      | 2         |
| 2.3      | Adornment, art and the sound of bells   | 4         |
| 2.4      | The copper trade expands  | 4         |
| 2.5      | Coins, construction, cannons and copperplate printing   | 6         |
| 2.6      | Mining, metallurgy and trade in the Medieval World  | 4         |
| <b>3</b> | <b>DISCOVERIES, USES, PRODUCTION AND TRADE DURING THE SCIENTIFIC AND INDUSTRIAL REVOLUTIONS</b> | <b>28</b> |
| 3.1      | Copper's biocidal properties are exploited  | 6         |
| 3.2      | Copper conducts lightning   | 2         |
| 3.3      | Brass instruments – for musicians and scientists  | 6         |
| 3.4      | Conductivity – copper's most important property   | 8         |
| 3.5      | Pigmentation revisited and the mystery of turacos   | 2         |
| 3.6      | Mining, metallurgy and trade during the Scientific and Industrial Revolutions                   | 4         |
| <b>4</b> | <b>DISCOVERIES, USES, PRODUCTION AND TRADE SINCE THE INDUSTRIAL REVOLUTION</b>                  | <b>14</b> |
| 4.1      | Copper is used as a fertiliser  | 2         |
| 4.2      | Why our bodies need copper, and how we obtain it  | 8         |
| 4.3      | Mining, metallurgy and trade since the Industrial Revolution                                    | 4         |
| <b>5</b> | <b>WILL WE RUN OUT OF COPPER?</b>   | <b>2</b>  |
|          | <b>Total</b>  | <b>80</b> |



## Fonts, symbols and date notation

Thematic text

Philatelic text

☞ indicates extensive personal research

♀ and matted in brown - items difficult to acquire in good condition, rarity quantified

**RARE or similar** - items difficult to acquire in good condition, rarity not yet quantified

Date notation: BCE (before Common Era) and CE (Common Era),  
e.g., the Battle of Hastings was fought in 1066 CE.

## References

Smith, B.W. (n.d.) *60 Centuries of Copper*. Copper Development Association. McLean VA.  
<https://www.copper.org/education/history/60centuries/> Last accessed 9 Mar 2021. Guides basic structure of exhibit, but updated with many academic journal papers and internet sources.

Evans, C. & Saunders, O. (2015) A world of copper: globalizing the Industrial Revolution, 1830-70. *Journal of Global History* 10(1), 3-26.  
<http://researchonline.ljmu.ac.uk/id/eprint/9526/1/World%20of%20Copper%20REVISION%202.pdf> Last accessed 9 Mar 2021

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